Orange County Sanitation District
Source Control Division

Pre-Permit Inspection Report
(PPIR)

Permit Number:	11-1-132	Prepared by:	Tran, Jane H.
Company Name:	TIODIZE COMPANY, INC.	Date Inspected:	05/08/13
Sewer Address:	15701 INDUSTRY LANE HUNTINGTON BEACH 92649	Contact:	GARY WITTMAN R&D DIRECTOR

Description of Facility Operations

TIODIZE COMPANY, INC. (Tiodize) performs surface finishing, and painting on customer-supplied parts made of aluminum, stainless steel, and titanium alloys. Tiodize is a medium size job shop providing finishing services for aerospace, commercial, medical, and military/defense applications. The processing of a typical part may begin by masking areas of the part that do not require finishing or painting. The processing of a part through the wet surface finishing generally proceeds by alkaline cleaning, rinsing, surface finishing (anodizing, chemical etching, conversion coating, & color dying), rinsing, and drying. Wet operations are conducted manually by basket, hoist, and rack process techniques. The processing of a part through the painting operation typically proceeds by alkaline and/or solvent (acetone & methyl ethyl ketone) cleaning, organic coating (solvent & water based painting), and curing. Mask removal, if applicable, is accomplished by solvent soaking and manual wiping. The effluent discharge at Tiodize is generated by the various spent process solutions and the associated rinse wastestreams. The operations are housed in one of two buildings associated with the facility.

Operation(s) that do not generate wastewater include masking, painting, and bead blasting.

Waste/Wastewater generating operation(s) include acid deoxidizing, acid pickeling, alkaline cleaning and degreasing, aluminum etching, chem film, chromate treatment, color dying (black, blue, green, & red), D.I. water seal, dichromate seal, Diversey 511, fluorescent inspection, hard anodize type III, nickel seal, passivation (type II & type VI), phosphate fluoride, phosphoric acid, rinsing (countercurrent, running, spray, & static), solvent cleaning (acetone & methyl ethyl ketone), sulfuric anodize type II, titanium anodizing, titanium etching, and tri-acid etching.

Description of Waste/Wastewater Controls

Waste/Wastewater Controls Using Dragout Reduction

One of the most critical components for effective waste/wastewater control is minimizing dragouts. Reducing dragout will extend bath life, minimize and help stabilize the loading to the pretreatment system, and reduce chemical costs for replenishment and treatment.

Process baths at Tiodize are heated which helps reduce dragout. Because the viscosity and surface tension of the solution are typically lower when the temperature is raised, the heated solution drains off the parts more quickly, thereby reducing the amount of dragout. In addition, the evaporation makes room for

replenishing from the static dragout tank. At Tiodize, the alkaline cleaner, aluminum etch, black dye, hot D.I. seal, nickel seal, passivation, and sodium dichromate process tanks are heated.

Tiodize does not use static dragout tanks after the process baths to help recapture process solution that adheres to the workpiece. Static dragout tanks can reduce the amount of solution carried over into a subsequent rinse or process tank and therefore, can help extend their useful lives.

Rinsing/airflow methods are not used at Tiodize to aid in the removal of dragout solution from parts. The use of a spray or fog rinse above a heated process bath can help recover dragout on the workpiece.

Spray rinses are not used in combination with immersion rinsing at Tiodize. The use of a spray rinse in place of the initial running rinse can remove most dragout from the workpiece while generating less wastewater. Wastewater from spray rinsing is typically concentrated allowing the opportunity to recycle it into the process bath to compensate for evaporation. Concentrated wastewater requires less pretreatment capacity and therefore, allows the use of more efficient batch pretreatment.

Drip bars and manual hoists are used to facilitate the drainage of dragout. Hoists and drip bars allow operators to hang workpieces so the process solution drains back into the process tanks. Such devices reduce the strain on the employees as they move the workpieces between tanks. Reducing the strain or effort improves the chances that the employees will take the extra time to allow sufficient draining. At Tiodize, a manual hoist over the hard anodize tank helps handle large parts.

Tiodize utilizes strategic positioning of each workpiece on the rack to reduce the dragout. Because dragout is trapped in grooves or cavities present in or on workpieces as they are withdrawn from solution, consideration is taken as to how the pieces are positioned for immersion. This facilitates drainage of the solution in a consolidated manner while minimizing the amount trapped or dropped on to other pieces.

Drain boards or contiguous tanks are used to eliminate the space between tanks. As parts are moved from tank to tank, solution drips off the parts. The drain board captures the drops and returns the solution to the appropriate bath, while preventing spillage to the floor. With contiguous tanks, the solution drains directly back into the tank.

Waste/Wastewater Controls Using Water Reduction - Rinse Controls

Water reduction through rinse controls is an effective method for waste/wastewater control. Common rinse controls include the use of flow restrictors, "on-demand" rinse flow, and closed loop rinse systems.

Shut-off valves are used upstream of individual rinses at Tiodize to regulate the rinse flow and reduce the volume of water that needs to be treated. The shut-off valves limit the volume of rinse water flowing through the rinse system while maintaining a constant flow of fresh water. This helps improve the wastewater treatment by reducing the hydraulic demand and allowing better control of the feed rates across each of the pretreatment unit processes, the clarifier in particular.

Withe the exception of two tanks (15 & 37 - both conductivity actuated), Tiodize does not use on-demand flow controls which activate rinses only when parts are being processed or when the bath becomes unusable. On-demand flow controls reduce the volume of contaminated rinses that need to be treated and can subsequently reduce the feed to the pretreatment system.

Waste/Wastewater Controls Waste Management of Spent Solutions

Spent solutions can be a major source of variability that affects compliance because of the heavy pollutant loadings that can potentially impact the performance of the treatment system. Many methods are available to efficiently control and treat spent solutions. These include bath maintenance, evaporation of the plating bath solution, reclamation of chemicals by the supplier, recovering of metals and metal salts, reusing baths as pH adjusters, treating the spent solutions with a dedicated batch system, off-site disposal, and metering the spent solutions into the continuous pretreatment system.

Tiodize removes contaminants from its alkaline cleaners and degreasers by manually skimming the free-floating oils from the surface of the baths. By this simple maintenance, Tiodize extends the life of the baths.

Spent acid and alkaline solutions are typically discarded when contaminants exceed an acceptable level. Tiodize uses some of their spent solutions for pH adjustment in the treatment process, taking advantage of the opportunity to minimize pretreatment chemical costs. At Tiodize, spent concentrated acid wastes, including the bail-out from anodize tanks, are metered into the chrome reduction tank to lower the pH, while the alkaline wastestreams are used to neutralize the continuous wastestreams after chrome reduction.

Concentrated spent solutions are not batch treated and/or wastehauled offsite. Instead, the spent solutions are treated using the continuous pretreatment system. Although concentrated spent solutions may be metered into the continuous pretreatment system in small amounts, it could easily cause concentration overload and pretreatment upset resulting in noncompliance.

Waste/Wastewater Controls Using Segregation

Segregation of wastestreams prior to comingling with other wastestreams can improve the efficiency of the preatreatment system and will result in lower treatment cost. Wastestreams requiring pollutant-specific treatment should be kept separate to ensure that only those wastewater requiring specific treatment are treated, and not all of the wastes, which could increase the chemical usage and sludge volume.

At Tiodize, wastestreams are segregated by type. Segregated wastestreams containing hexavalent chromium are chemically treated to reduce the hexavalent chromium to trivalent chromium. After chrome reduction, the trivalent chromium wastestream is further treated by chemical precipitation to remove the metals.

Wastestreams with low contaminant concentrations, typically from rinsing operations, are separated from the highly concentrated solutions generated during the periodic dumping of spent process solutions. The metal-bearing rinse wastestreams are directed to the chrome reduction stage of the continuous pretreatment system. However, instead of batch treating or wastehauling the spent concentrated solutions, Tiodize meters all the segregated concentrated wastes back into the continuous pretreatment system which defeats the purpose of segregating wastes based on strength. The concentrated acidic solutions, including anodize tank bail-out, are metered into the chrome reduction tank to lower the pH. The concentrated alkaline solutions are metered into the neutralization tank following the chrome reduction to raise the pH back to the optimum range for hydroxide precipitation. Concentrated nickel-bearing solutions are also bled into the neutralization tank. Introducing these raw wastes into the continuous pretreatment wastestream increases the potential for wide concentration fluctuations. Tiodize could reduce variabilities affecting the continuous system treatment chemistry by batch treating the concentrated wastes that are already segregated.

Waste/Wastewater Controls Using Pretreatment System

Adequate design and reliable operation of a pretreatment system is critical for maintaining compliance. Within the pretreatment system, good controls will eliminate variabilities affecting the performance of the pretreatment system.

Tiodize has contaminated wastestreams that require pretreatment prior to discharge to the sewer. Therefore, the use of a pretreatment system is necessary to provide good wastewater control to meet consistent compliance. Tiodize has operations that generate categorical wastestreams. Tiodize utilizes a continuous pretreatment system. All contaminated wastestreams, including spent solutions, are treated using the continuous pretreatment system.

Flow equalization is used to dampen the influent wastewater flowrate and concentration so that a constant or nearly constant flowrate and concentration are achieved. Flow equalization typically overcomes the operational problems caused by flowrate variations, improves the performance of the downstream processes, and reduces the size and cost of downstream treatment units. At Tiodize, individual equalization tanks are utilized for each of the segregated wastes (chromium-bearing, nickel-bearing, & alkaline) prior to treatment. Although equalization may help dampen the flow rate variations, it may not be sufficient to handle the concentration variations from the highly concentrated spent chemicals that are metered into the continuous pretreatment system.

Tiodize utilizes a flow-through clarifier for solids settling following continuous flow chemical precipitation. It has a conical bottom which facilitates efficient withdrawal of sludge. The clarifier has baffles and/or plates that enhance settling. Wastewater is transferred from chemical precipitation to the clarifier by gravity flow. Sludge generated in the clarifier is automatically removed by pumping directly to a sludge thickening tank for better sludge control, then filter pressed for solids dewatering. Sludge removal occurs continuously.

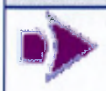
There was good floc formation observed during the inspection. This is an indication that reactions are completed to their endpoints and there is general compatibility of the wastewaters with treatment. There is no solids accumulation in the clarifier noted. Maintaining a low sludge level in the clarifier prevents short circuiting and solids carry-over to the effluent. Good settling was also observed during the inspection; no solids carry-over was noted. Overall, the clarifier operation seems adequate and well controlled. Based on observations of the clarifier operation, the hydraulic capacity of the clarifier seems adequate. Adequate clarifier capacity allows constant feed rates and improves the efficiency of solids removal. The clarifier seems properly designed in terms of geometric configuration.

Tiodize uses a filter press for dewatering the sludge. The filtrate generated typically contains heavy metals that pass through the filter cloth. At Tiodize, the filtrate is not discharged directly to the sewer but is returned back to the rinse equalization sump at the beginning of the pretreatment system for additional treatment to preclude contamination of the final effluent. Supernatant decanted from the sludge thickening process, which may also contain heavy metals, is returned to the rinse equalization sump at the beginning of the pretreatment system for additional treatment.

The use of proper instrumentation and control to measure and achieve desired operational parameters, coupled with regular calibration and maintenance are essential for reliable operation. At Tiodize, adequate instrumentation and pretreatment process control is provided.

Wastewater treatment operators play a key role in the operation of the pretreatment system. At Tiodize, pretreatment operators are provided during all shifts of discharge. The treatment operator, Felix Dela Cruz, has formal training/certification in wastewater treatment. Certification includes completion of Wastewater Treatment Course from Cal State University (Ken Kerri). Having trained operators helps to ensure proper operation and maintenance of the pretreatment system. At Tiodize, an Operations and Maintenance (O/M) Manual is available to guide the operators. The O/M Manual is available in English.

Waste/Wastewater Controls Through Environmental Management Practices



Management commitment to achieve environmental compliance is a principal component for effective waste/wastewater control.

One way the management can demonstrate its commitment to environmental or regulatory compliance is through a written company policy. At Tiodize, a written policy or mission statement forms the basis for the company's routine business practices pertaining to compliance.

Commitment to environmental compliance can also be demonstrated by conducting routine monitoring beyond the minimum required frequency. Additional sampling and analysis of the wastewater discharge improves compliance by providing an indication of pretreatment performance, thus helping to identify and resolve problems quickly. Currently, Tiodize collects two grab samples per day and analyzes them nickel and hexavalent chromium using a simple test kit. While this additional monitoring of the wastewater discharge does not confirm daily compliance, it does provide a limited indication of the pretreatment system performance.

Tiodize maintains records of its pretreatment system status (Daily Operations Log), equipment maintenance (Daily Pump & Tank Inspection & Pretreatment Maintenance Logs), operations (daily city water meter readings), control operating parameters (effluent pH recorder), chemical supply (Maintenance Log), and sampling (grab analysis results). Maintaining logs and records is important for a company, to understand its maintenance needs, chemical use, and operating parameters, among others. The records describe activities during daily operations and provide good source of information for diagnostics when problems arise.

Tiodize has a company policy empowering the treatment operators, or other personnel, to shut down the wet processes when a pretreatment upset occurs. This authorization allows the treatment operators to correct the problem and restore the system to proper operating conditions, thereby preventing any further noncompliant discharge. At Tiodize the wastewater treatment operator, Felix Dela Cruz has authorization to shut down the wet processes in the event of a treatment upset.

The permittee has an updated slug control plan or equivalent on site.

Slug Control Plan Notification procedure and information is posted at permittee location.

Recommendations for Improvement

Waste/Wastewater Controls Using Dragout Reduction

- Use static dragout tanks as the initial rinse following the process bath to recapture process solution that adheres to the workpiece. This will reduce the amount of solution carried over into a subsequent rinse or process tank, and can help extend their useful lives. Returning the contents of a subsequent static dragout tank back to a heated process bath will compensate for evaporative losses.
- Use spray or fog rinse systems above heated baths to recover dragout on the workpiece. Purified water should be used for these systems in order to reduce bath contamination from the rinse water. The spray rinse flow rate should be adjusted to be equal to the evaporation rate of the tank so it can be used to replenish evaporation losses. As the workpiece rack is raised above the process tank, air can be blown at the workpieces to improve the drainage of the dragout solution into the process bath. High humidity air can be used in order to counteract workpiece drying.
- Use a spray rinse in place of an initial running rinse to remove most of the dragout from the workpiece while generating less wastewater. Consider recycling the concentrated spray wastewater back into the process bath to compensate for solution dragout and/or evaporation. If the spray wastewater can not be returned to the process bath, this concentrated wastewater can still be treated more efficiently, compared to a dilute immersion rinse wastestream, due to the reduced pretreatment capacity required.

Waste/Wastewater Controls Using Water Reduction - Rinse Controls

- Use on-demand flow controls to reduce the water usage by activating rinses only when parts are being processed or when the bath becomes unusable. This will reduce the volume of contaminated rinse wastewater that needs to be treated. Four common types of on-demand flow controls include pH-activated, conductivity-activated, kick plates, and photosensors. A pH sensor gives an indication of the cleanliness of the rinsewater, and can be designed to trigger clean rinsewater flow when the tank water exceeds its predetermined pH range. Conductivity-actuated flow controllers function in a similar manner by sensing the level of ions and triggering clean water flow when the ion level reaches a preset level. Kick plates allow the operator to activate rinses only when processing parts. A photosensor may be used on automatic plating lines and serves to turn on rinses only when a part is being processed. A timer may be used on plating lines to allow rinses to operate for a pre-determined amount of time.

Waste/Wastewater Controls Waste Management of Spent Solutions

- Treat concentrated spent solutions using a separate batch treatment system and/or wastehaul the solutions offsite, instead of using continuous treatment. This results in less variability in the concentration of contaminants going to the continuous pretreatment system. Off-site disposal eliminates the need to treat and sewer the material.

Waste/Wastewater Controls Through Environmental Management Practices

- Consider conducting additional 24-hour composite self-monitoring beyond the minimum required frequency. The District encourages voluntary self-monitoring as a means to diagnose and avert potential non-compliance problems. Submitting additional self-monitoring data to the District supplements the official compliance record, and may be useful in establishing compliance and/or demonstrating the long-term effectiveness of a company's wastewater management program. The Wastewater Discharge Permit describes the techniques for collecting and analyzing valid self-monitoring samples. The permit engineer may be contacted for details on how to submit additional self-monitoring data.

Sources of Waste/Wastewater and Destination

			Pollutants									Rinse Strategy								Group Destination																
Ctrl #	Tank ID	Tank Name	Process	Hexavalent Chromium	Cyanide	General Heavy Metals	Electroless Copper	Electroless Nickel	Conventional Pollutant	Other	None	Running	Counter Current	Spray	Static	Recycle	Controller	None	Other	Cr f/b HM CTS	CN f/b HM CTS	CTS- Chrome Reduction	CTS- Cyanide Destruction	CTS - HM Precipitation	Batch Treatment	Wastehauled Offsite	Discharged to SP	Replenish	Return to Process Tank	pH Adjust Only	I.X.System	Electrowinning	Other	Bled to CTS
1	1	hard anodize type III	✓			✓												✓		✓															
2	2	sulfuric anodize type II	✓			✓												✓		✓															
3	3	D.I. water seal	✓			✓												✓		✓															
4	4	hot D.I. rinse				✓									✓					✓															
5	5	dichromate seal	✓	✓		✓												✓		✓															
6	6	running rinse		✓		✓						✓								✓															
7	7	nickel seal	✓			✓												✓						✓											
8	6/8/9	countercurrent rinse				✓							3							✓															
9	10	aluminum etch	✓			✓												✓						✓											
10	12	acid deoxidizer	✓			✓												✓											✓						
11	13	chem film	✓	✓		✓												✓		✓															
12	14	dye	✓			✓												✓											✓						
13	15	running rinse				✓						✓								✓															
14	16	black dye	✓			✓												✓											✓						
15	17	blue dye	✓			✓												✓											✓						
16	18	dye	✓			✓												✓		✓															
17	19	aviation alkaline cleaner	✓			✓												✓						✓											
18	20	HTC alkaline cleaner	✓			✓												✓						✓											
19	22/21	countercurrent rinse		✓		✓							2							✓															
20	23	phosphoric acid	✓			✓												✓		✓															
21	24	hot D.I. rinse				✓									✓					✓															
22	25	passivation type VI	✓	✓		✓												✓		✓															
23	26	passivation type II	✓	✓		✓												✓		✓															
24	27	chromate treatment	✓	✓		✓												✓		✓															
25	28	titanium anodize	✓			✓												✓						✓											
26	29	titanium anodize	✓			✓												✓						✓											
27	30	titanium etch	✓			✓												✓		✓															
28	32	phosphate fluoride	✓			✓												✓		✓															
29	33	titanium etch	✓			✓												✓		✓															

			Pollutants										Rinse Strategy								Group Destination																
Ctrl #	Tank ID	Tank Name	Process	Hexavalent Chromium	Cyanide	General Heavy Metals	Electroless Copper	Electroless Nickel	Conventional Pollutant	Other	None		Running	Counter Current	Spray	Static	Recycle	Controller	None	Other	Cr f/b HM CTS	CN f/b HM CTS	CTS- Chrome Reduction	CTS- Cyanide Destruction	CTS - HM Precipitation	Batch Treatment	Wastehauled Offsite	Discharged to SP	Replenish	Return to Process Tank	pH Adjust Only	I.X.System	Electrowinning	Other	Bled to CTS	
30	34	titanium etch	✓																✓		✓															
31	35/36	alkaline degreaser	✓			✓													✓						✓											
32	40	green dye	✓			✓													✓										✓							
33	37	dragout rinse				✓										✓					✓															
34	39	red dye	✓			✓													✓										✓							
35	52	fluorescent penetrant	✓						✓										✓								✓									
36	53	penetrant spray rinse							✓						✓						✓															

Waste Stream Destination Concern List

None.

Pretreatment Unit Processes

The following pretreatment unit processes are in place at this facility:

Continuous	Batch
☒Continuous Chromium Reduction	☐Multi-Purpose Batch Tank 1
☐Contin.Cyanide Destruct 1Stage	☐Multi-Purpose Batch Tank 2
☐Contin.Cyanide Destruct 2Stage	☐Multi-Purpose Batch Tank 3
☒Equalization tank	☐Batch Chrome Reduction
☒Contin. Chemical Precipitation	☐Batch Cyanide Destruct 1Stage
☒Effluent pH Adjustment	☐Batch Cyanide Destruct 2Stage
☒Continuous Coag/Floc	☐Batch Chemical Precipitation
☐pH Adjust Tank-No Heavy Metals	☐Batch Coagulation/Flocculation
☐Clarification neop	☐Plate & Frame Filter Press
☒Sludge Thickening Tank	☐Batch Chelate Breaking Tank
☐Clarification eop	☐Batch Clarification
☐Continuous O/W Sep	☐Sludge Thickening Tank
☐Polishing Filter	☐Polishing Filter
☒Plate & Frame Filter Press	☐Batch O/W Sep
☐Other Pressure Filtration Device	☐Electrowinning/Plateout
☐Ion Exchange	☐Effluent pH Adjustment
☐Anion Exchange	☐Anion Exchange
☐Cation Exchange	☐Cation Exchange
☐Mixed-Bed Ion Exchange	☐Mixed-Bed Ion Exchnage
☐Cross Flow Filter (Memtek)	☐Carbon Filtration
☐Sorption Filter (Lancy)	☐Holding Tank
☐Aluminum Chip	
☐Holding Tank	

The continuous pretreatment vessels include: Continuous Chromium Reduction; Equalization tank; Contin. Chemical Precipitation; Effluent pH Adjustment; Continuous Coag/Floc; Sludge Thickening Tank; Plate & Frame Filter Press.